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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/646,307	08/22/2003	Katherina Babich	YOR920030129US1	9204

7590 04/05/2006

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EXAMINER	
LEE, SIN J	

ART UNIT	PAPER NUMBER
1752	

DATE MAILED: 04/05/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/646,307	BABICH ET AL.	
	Examiner	Art Unit	
	Sin J. Lee	1752	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 January 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-34* is/are pending in the application.

4a) Of the above claim(s) *24-34* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13,15,16 and 18-23* is/are rejected.

7)☒ Claim(s) *14 and 17* is/are objected to.

8)☒ Claim(s) *1-34* are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *15 September 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. In view of applicants' argument, previous 112 rejection on claims 1-23 is hereby withdrawn.

2. Due to new ground of rejection, the following rejection is made non-final.

Claim Rejections - 35 USC § 103

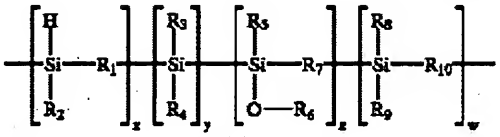
3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-13, 15, 16 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Apen et al (US 2003/0017635 A1).

Apen teaches (see ([0013]-[0022]) a thermally stable, low dielectric constant polyorganosilicon dielectric film for use as semiconductor insulators. The polyorganosilicon film is generated from specified polycarbosilane starting material by (i) applying to a suitable surface a composition comprising a *polycarbosilane* compound of the general formula shown below;

FORMULA I



[0015] in which:

[0016] R_1, R_7, and R_{10} each independently represents a substituted or unsubstituted alkylene, cycloalkylene, or arylene group;

[0017] R_2, R_3, R_4, R_5, R_8 and R_9 each independently represents a hydrogen atom or a first organic group, wherein the first organic group comprises alkyl, alkenyl, alkynyl, alkylene, vinyl, cycloalkyl, allyl or aryl and may be linear or branched and may be substituted or unsubstituted; and

[0018] R_6 represents an organosilicon, a silanyl, a siloxyl, or a second organic group; and

[0019] x, y, z and w satisfying the conditions of [4<x+y+z+w<100,000], and y and z and w can collectively or independently be zero.

[0020] The first and second organic groups, or any other organic groups contemplated herein, may contain up to 18 carbon atoms but generally contain from about 1 to about 10 carbon atoms. Particularly useful alkyl groups include $-CH_2-$ and $-(CH_2)_e-$ where e>1.

and (ii) subjecting the polycarbosilane-coated surface to an energy source to chemically react the polycarbosilane compound and to subsequently *crosslink* the polycarbosilane compound to form the polyorganosilicon material.

Specifically, in Example 1, Apen uses allylhydridopolycarbosilane having the structure of $[[Si(CH_2CH=CH_2)H\text{-}CH_2]_{0.1}[SiH_2\text{-}CH_2]_{0.9}]_n$ (which fits the general formula I shown above) as his polycarbosilane. Since Apen teaches that R_8 and R_9 in his Formula 1 can be H atom as well as an alkyl group or an aryl group (i.e., Apen teaches the equivalence of H atom, alkyl group and aryl group), it would have been obvious to one skilled in the art to use $[[Si(CH_2CH=CH_2)H\text{-}CH_2]_{0.1}[Si(alkyl)(aryl)\text{-}CH_2]_{0.9}]_n$ as Apen's

polycarbosilane with a reasonable expectation of obtaining a thermally stable, adhesive, low dielectric constant polyorganosilicon dielectric film. The first repeating unit of the polycarbosilane $[[Si(CH_2CH=CH_2)H\text{-}CH_2]_{0.1}[Si(alkyl)(aryl)\text{-}CH_2]_{0.9}]_n$ has an allyl group as well as Si-H bond, both of which are crosslinking components (see present specification, pg.8, lines 17-18). The second repeating unit of the polycarbosilane as an alkyl group (a transparent moiety) as well as an aryl group (a chromophore moiety). Therefore, Apen's teaching renders obvious present inventions of claims 1, 4-13, 15 and 16 (it is the Examiner's position that Apen's coating comprising the polycarbosilane compound having the chromophore moiety, transparent moiety and crosslinking components would inherently be capable of being uses as the present antireflective hardmask layer for lithography).

With respect to present claims 2 and 3, according to the general Formula I shown above, Apen's polycarbosilane compound can further include a SiO-containing repeating unit. Therefore, it would have been obvious to one skilled in the art to further include a SiO-containing repeating unit in Apen's polycarbosilane compound, $[[Si(CH_2CH=CH_2)H\text{-}CH_2]_{0.1}[Si(alkyl)(aryl)\text{-}CH_2]_{0.9}]_n$ with a reasonable expectation of obtaining a thermally stable, adhesive, low dielectric constant polyorganosilicon dielectric film. Thus, Apen's teaching renders obvious present inventions of claims 2 and 3.

In [0047], Apen teaches that his polycarbosilane-coated surface may comprise a substrate, a dielectric material, or any other suitable material or layered material that

can be used in an electronic or semiconductor application. Therefore, Apen's teaching also renders obvious present invention of claim 23.

5. Claims 18-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Apen et al (US 2003/0017635 A1) in view of Shelnut et al (US 6,440,642 B1).

Although Apen does not mention the use of a thermal acid generator, it is known in the art to use thermal acid generators such as benzoin tosylate or 2-nitrobenzyl tosylate for catalyzing the crosslinking reaction of a low dielectric constant material, as evidenced by Shelnut, col.9, lines 49-60, col.10, lines 12-22. Therefore, it would have been obvious to one skilled in the art to use thermal acid generators such as benzoin tosylate or 2-nitrobenzyl tosylate in order to catalyze the crosslinking reaction of Apen's polycarbosilane compound. Therefore, Apen in view of Shelnut render obvious present inventions of claims 18-22.

Allowable Subject Matter

6. Claims 14 and 17 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Apen does not teach or suggest present crosslinking component of claims 14 and 17.

Response to Arguments

7. Applicants argue that Apen does not suggest a compound comprising a crosslinking compound. Applicants' such argument is not persuasive because as addressed above in Paragraph 4, the first repeating unit of Apen's polycarbosilane $[[Si(CH_2CH=CH_2)H\text{-}CH_2]_{0.1}[Si(alkyl)(aryl)\text{-}CH_2]_{0.9}]_n$ has an allyl group as well as Si-H

bond, both of which are crosslinking components (see present specification, pg.8, lines 17-18).

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sin J. Lee whose telephone number is 571-272-1333. The examiner can normally be reached on Monday-Friday from 9:00 am EST to 5:30 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cynthia Kelly, can be reached on 571-272-1526. The fax phone number for the organization where this application or proceeding is assigned is **571-273-8300**.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

S. J. L.

S. Lee
April 3, 2006

Sin J. Lee

SIN LEE
PRIMARY EXAMINER